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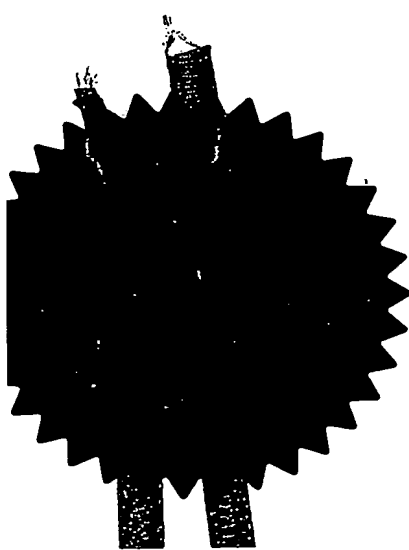
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The Patent Office

Cardiff Road  
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1. Your reference

11307P5 GB/JCM

2. Patent application number

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0320240.5

29AUG03 E833575-1 002903  
P01/7700 0.00-0320240.5

3. Full name, address and postcode of the or of each applicant (underline all surnames)

Reckitt Benckiser (Australia) Pty Limited  
44 Wharf Road  
West Ryde  
NSW 2114  
Australia

Patents ADP number (if you know it)

07954431001 ✓

If the applicant is a corporate body, give the country/state of its incorporation

Australia

4. Title of the invention

Insecticide Composition

5. Name of your agent (if you have one)

John Crawford McKnight  
Reckitt Benckiser plc  
Group Patents Department  
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HULL  
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UNITED KINGDOM

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

Patents ADP number (if you know it)

07799521001 ✓

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number  
(if you know it)

Date of filing  
(day / month / year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application  
(day / month / year)

Date of filing  
(day / month / year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

Yes

- a) any applicant named in part 3 is not an inventor, or
  - b) there is an inventor who is not named as an applicant, or
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# Patents Form 1/77

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Continuation sheets of this form

Description	28
Claim(s)	8
Abstract	1
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Priority documents  
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Statement of inventorship and right to grant of a patent (Patents Form 7/77)

Request for preliminary examination and search (Patents Form 9/77) One

Request for substantive examination (Patents Form 10/77) One

Any other documents (please specify) FS1

1. I/We request the grant of a patent on the basis of this application.

Signature

Date

John C McKnight

26 August 2003

2. Name and daytime telephone number of Person to contact in the United Kingdom

John C McKnight (01482) 583719

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5

# INSECTICIDE COMPOSITION

## Technical Field

The present invention relates to insecticidal compositions, and more specifically to both novel forms of insecticidal compositions and methods of controlling crawling pests such as cockroaches.

## Background Discussion and Prior Art

Insects such as cockroaches and ants are a continual problem in both domestic, commercial and industrial establishments. They are difficult to control, finding harbourage in a multitude of locations including behind and under cabinets, appliances, sinks and worktops and in cupboards. Furthermore, they can readily move to a new home when a harbourage becomes unacceptable.

Conventional methods for controlling such pests include aerosol sprays and baits. However, each of these methods has disadvantages. Aerosol products do not generally have a long residual activity and the spray tends to radiate widely, going onto surfaces where protection is not sought or where the active ingredient is not wanted. In addition, aerosol propellants tend to be flammable.

30

Bait compositions come in a variety of forms including tablets, pastes, gels and other semi-solid preparations. Bait compositions are frequently held in a container or housing that only allows insect access. This means that baits cannot be placed in many areas where the insects might walk or find harbourage, such as

5 around the periphery of cabinet doors, on the undersides of worktops, or along junctions.

U.S. Patent No. 3,162,575 (Lang) discloses an insecticide stick for flies having a microcrystalline wax  
10 base mixed with petroleum oil, sugar and an insecticide. The insecticide is applied to the faces of domestic livestock by rubbing, preferably between the eyes. The sugar reportedly causes the flies to be drawn toward the area of the face which is coated with the active  
15 ingredient.

U.S. Patent No. 3,826,232 (Duffey et al.) discloses a pest control stick for application to the neck or face of domestic animals to control fleas, lice, ticks, flies  
20 and the like. The stick comprises 0-(2-isopropoxyphenyl)-N-methyl carbamate as the active insecticide, fatty acid, fatty alcohol, polyethylene glycol and, preferably, a bitter tasting compound which serves to discourage licking by other animals and tasting  
25 by children.

U.S. Patent No. 4,473,582 (Greene) discloses an insecticidal stick for application to a household surface or domestic animals. The sticks comprise water-insoluble  
30 insecticide, fatty hydrocarbon monoether or propylene glycol and a monoethanolamide of a fatty acid. When applied to a household surface, the stick reportedly deposits a thin film of the stick formulation on the surface and insects, such as cockroaches, walking or  
35 crawling over the film, it is believed, ingest or absorb the insecticide through their cuticles.

5 GB 608,715 (Ash Laboratories Limited) discloses  
solid insect control materials formed by compacting and  
subsequently drying a mixture of active insecticide, a  
liquid and a solid diluent or filler. The mixture may  
also contain a waxy or fatty substance so as to form a  
10 waxy crayon-like solid.

The solid insecticidal sticks described in the prior  
art address only some of the problems associated with the  
use of conventional pest control methods. Hence, there  
15 is still a clear need for improved compositions and  
methods for controlling pests, especially crawling  
insects such as cockroaches.

#### Summary of the Invention

20 Accordingly, in a first aspect, this invention  
provides a solid stick insecticidal composition  
comprising a base having dispersed therein an insecticide  
and an attractant or a food material, whereby when the  
stick is applied to a hard surface it leaves a deposit of  
25 the composition on the surface.

~~----- In a second aspect, this invention provides a method -----~~  
for controlling insects in which a solid stick  
composition comprising a base having dispersed therein an  
30 insecticide and an attractant or a food material is  
applied to a hard surface to be treated.

In a third aspect, this invention provides an insect  
control product comprising a solid stick insecticidal  
35 composition according to the first aspect which is  
packaged.

5        In a fourth aspect, this invention provides for use of an insecticide and an attractant or a food material in the manufacture a solid stick insecticidal composition for application to a hard surface to be treated.

10        The compositions and methods of pest control of the present invention are highly effective against crawling insects and provide significant improvements over the insecticidal sticks of the prior art. The prior art compositions, such as that described in US 4,473,582, are  
15 only effective when carefully applied as an unbroken line such that the insects invariably cross the line at some point in their travels. In contrast, the insecticidal compositions of the present invention can be applied to hard surfaces as "spots" or short lines of material  
20 whilst still providing a level of pest control that is at least as equivalent and typically more effective than that described in the prior art. The insecticidal sticks of the present invention are therefore considerably easier and more convenient to use than those described  
25 previously. Furthermore, less material is required to be deposited to obtain equivalent levels of pest control, e.g. kill rates. The insecticidal sticks of the present invention are also stable and possess a long residual activity.

30        Throughout this specification the word "comprise", or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated element, integer or step, or group of elements, integers or steps,  
35 but not the exclusion of any other element, integer or step, or group of elements, integers or steps.

5 Any discussion of documents, acts, materials, devices, articles or the like which has been included in this specification is solely for the purpose of providing a context for the present invention. It is not to be taken as an admission that any or all of these matters  
10 form part of the prior art base or were common general knowledge in the field relevant to the present invention as it existed before the priority date of each claim of this application.

15 Detailed Description of the Invention

As used herein, all figures given as %wt are, unless specified otherwise, the percentage by weight of that component relative to the total weight of the solid stick insecticidal composition. Where a set of parameter  
20 ranges are given for a particular component or composition, it will be understood that any lower limit in that set of ranges may be combined with any upper limit in the same set of ranges to provide a suitable range limit for that component or composition.

25

Where an ingredient can perform more than one  
-----function,---for---example---act---as---both---a---food---material-----  
component and as part of the base composition, it will be understood that, unless specifically indicated otherwise,  
30 it can contribute to the stated weight ranges relating to both functions equally.

35



5 Insecticide Component

The compositions of the present invention comprise at least one insecticide component. Suitable insecticides may be chosen from a wide range of active ingredients, both natural and synthetic.

10

Examples of suitable insecticide ingredients include pyrethroids, neonicotinoids (e.g. imidacloprid, thiamethoxam), avermectins, spinosyns (e.g. spinosad), hydramethylnon, fluorinated sulfluoramides, organophosphates including diazinon and chlorpyrifos, pyrazoles such as fipronil, chlorfenapyr, indoxacarb, borates, benzoylphenyl ureas, carbamates and hydrazones. A preferred insecticide in the present invention is chlorpyrifos.

20

One or more insecticides may be employed. In addition, insecticide(s) may be micro-encapsulated, non-encapsulated or a combination of the two. For example, a combination of non-encapsulated and microencapsulated chlorpyrifos may be used. The particular choice of insecticide(s) depends on several factors including the target insect(s), the strategy for killing the insects, the regulatory approval status in a particular country, cost, etc. As regards the strategy for killing insects, insecticides can act in a variety of ways. For example, some insecticides directly kill the insects, some affect the fecundity of the insect such that the insect population is reduced in subsequent generations, and some alter the behaviour of the insect in a manner that will bring about their destruction. In addition, insect populations can also be reduced as a result of

35

- 5 transmission of insecticidal composition between insects  
- this is generally referred to as "secondary kill".

The total amount of insecticide in the solid stick  
insecticidal composition will suitably range from 0.01 to  
10 40 wt%, preferably from 0.01 to 20 wt%, more preferably  
from 0.01 to 10 wt%, yet more preferably from 0.01 to 5  
wt%, even more preferably from 0.02 to 5 wt% and most  
preferably from 0.03 to 3 wt%.

- 15 Biological control agents, such as the bacterium  
*Bacillus thuringiensis* or entomophagous fungi (e.g.  
*Beauveria bassiana*) could also potentially be used as  
'active ingredients' in the present invention. For the  
purposes of the present invention, any amount of  
20 biological control agent present is considered to form  
part of the insecticide component as regards weight  
ranges.

#### Food Material and Attractant Components

25

The compositions of the present invention comprise  
~~at least one attractant component, at least one food~~  
material component, or a combination of the two.

- 30 In a preferred embodiment, the insecticidal  
compositions comprise at least one food material and  
optionally at least one attractant. Where compositions  
comprise a food material and an attractant, this may be  
achieved by using separate food and attractant components  
35 or alternatively by using an ingredient that acts both a  
food material and an attractant.

5        Examples of suitable food materials include carbohydrates, proteins, lipids, essential oils, water, spices and mixtures thereof. Preferred carbohydrates include honey, sugars (including monosaccharides and disaccharides), oligosaccharides, polysaccharides and  
10 other complex carbohydrates such as starches, pectins and cellulosic materials. Examples of suitable starches include those found in flours such as, for example, corn flour and potato flour. Other preferred carbohydrate and/or protein food materials include soya flour, cereal  
15 products such as bran and wheat germ, vegetable products, dehydrated vegetables, dried yeast, egg powder and insect derived materials such as silkworm pupa, eggs and body parts.

20        Other preferred food materials include fats and oils such as fully hydrogenated fatty acids. A preferred oil is soya bean oil. Other fatty materials that may be used include esters, waxes, soaps, phospholipids such as lecithin, glycolipids, terpenes and steroids.

25        Examples of suitable attractants, which attract through smell and/or other neurosensory pathways, include pheromones, yeast extracts, complex foods and volatile materials such as flavour essences and food derivatives  
30 including fenugreek, maple lactone, herbs and spices. When insecticides are themselves repellant in nature to insects, an attractant as taught and disclosed in WO 97/00610 (R & C Products Pty Ltd) may suitably be used. Preferred attractants include maple lactone, soya bean  
35 oil, malt extract and honey.

5        Examples of dual functionality food materials, which  
also act as attractants, include soya bean oil, spices,  
yeasts, yeast extracts and maple lactone. The function  
of each material will of course depend to some extent on  
the particular species of insects you are looking to  
10 treat. For example, soya bean oil, honey, malt extract  
and maple lactone all act both as food materials and  
attractants for cockroaches. Preferably, the  
insecticidal compositions of the present invention  
comprise maple lactone, which is suitably present in an  
15 amount of from 0.001 to 1 wt%, preferably from 0.005 to  
0.5 wt % and more preferably from 0.005 to 0.05 wt%.

Suitably, the total amount of food materials and  
attractants in the solid stick insecticidal compositions  
20 will range from 1, preferably from 5, more preferably  
from 10, yet more from 20, yet more preferably from 40  
and yet more preferably from 50 wt% to 99.99 wt%.  
Particularly preferred ranges are from 70 to 99.99 wt%,  
more preferably from 90 to 99.99 wt%. With regards to  
25 the aforementioned weight ranges, where a food material  
has dual functionality (i.e. it also acts as an  
~~attractant), its content is only taken into consideration~~  
the once.

### 30 Optional Components

The insecticidal compositions may also comprise one  
or more optional components such as preservatives, anti-  
oxidants, feeding stimulants, fillers, animal (including  
35 human) taste deterrents and colorants.

5       A preservative may be present to inhibit the growth of microorganisms on the composition, as such growth may potentially repel insects. Amongst the preservatives that may be used are sorbic acid and salts thereof (e.g. potassium sorbate), Dowicil<sup>TM</sup> (Dow-Elanco) and methyl-  
10 and propylparabens. Suitably, preservatives may be present in an amount from 0.0001 to 10 wt%, preferably from 0.001 to 5 wt%.

      Anti-oxidants may be present to maintain food  
15 material palatability in an amount of from 0.0001 to 10 wt%, preferably from 0.001 to 5 wt%. Suitably, in compositions that include fats and/or oils, an antioxidant such as TBHQ, butylated hydroxytoluene or butylated hydroxyanisole is used. TBHQ is a preferred  
20 anti-oxidant in insecticidal sticks of the present invention.

      Human taste deterrents may be included to minimise the risk of accidental consumption. Suitable deterrents  
25 include denatonium benzoate (Bitrex<sup>TM</sup> MSL). When present, a human taste deterrent is suitably used in an amount of from 1 to 200 ppm, preferably from 1 to 100 ppm, more preferably from 10 to 50 ppm and most preferably from 5 to 20 ppm.

30

      The sticks may be coloured by including one or more colorants in the formulation. Suitable colorants include, for example, many of the conventional food dyes, e.g. carmoisine. Suitably, a colorant may be present in  
35 an amount of up to 1 wt%, preferably from 0.0005 to 0.5

5 wt%, more preferably from 0.0005 to 0.2 wt% and yet more preferably from 0.0005 to 0.05 wt%.

#### Base

10 The insecticide and attractant and/or food material components are dispersed within a fatty base. The base composition may also have dispersed therein one or more optional components. Preferably, all the components of the stick are uniformly dispersed within the base  
15 composition.

All the base ingredients contribute to the physical and rheological properties of the stick. Some ingredients may contribute primarily to the physical  
20 properties of the stick, i.e. the hardness or rigidity of the stick, some may act primarily as lubricants, some may act primarily as emollients or emulsifiers and some may act primarily as adhesion promoters or binding agents. It may also be beneficial to employ ingredients in the  
25 base which act primarily as solvents for certain components, for example certain insecticide components, of the insecticidal stick. A preferred insecticide of the present invention is chlorpyrifos and this is preferably dissolved in a suitable solvent component of  
30 the base composition such as, for example, hydrogenated palm stearine and soya bean oil.

Suitable base ingredients include fatty alcohols, fatty acids, various esters including lower alkyl esters  
35 of fatty acids, polyethylene glycols (carbowaxes), monoalkanolamides, castor oil, mineral oils and petroleum jellies. Suitable base materials which contribute to the

5 hardness and rigidity of the sticks are typically materials having higher melting points. Such materials are also important in the moulding process. These materials are typically waxes or wax-like materials and include carnauba wax, candelilla wax, amorphous  
10 hydrocarbon waxes, petroleum-based waxes such as microcrystalline wax, beeswax, paraffin waxes, cocoa butter, hydrogenated vegetable oils such as hydrogenated palm stearine and hydrogenated castor oil, lanolin and lanolin absorption bases, some paraffin oils, lecithin  
15 and silicone waxes.

Some ingredients can have a dual function as a food material and as a component of the base. Examples of such dual functionality ingredients include hydrogenated  
20 palm stearine, tallow, lard, suet and duck fat. In addition, some food materials that are not at all waxy or fatty in nature also act as base ingredients. For example, flours, e.g. soya flour, can act as binding agents and thus effect the rheology of the base  
25 composition. In addition, ingredients such as lecithin and monoglycerides can act as emulsifiers, helping to suspend and disperse hydrophilic materials in hydrophobic materials and vice-versa. Preferably, the base composition comprises one or more materials which act as  
30 emulsifying agents. Such materials are suitably present in amount of from 1 to 10 wt%, preferably from 2 to 8 wt% of the solid stick insecticidal composition.

Preferably, the base comprises at least one of  
35 hydrogenated palm stearine, soya flour, lecithin and monoglyceride.

5        Suitably, the base composition has a melting point in the range from 20 to 200 °C, preferably from 35 to 100 °C and more preferably from 40 to 80 °C.

10        The total amount of base composition in the solid stick insecticidal composition will suitably range from 1.0 to 99.9 wt%, preferably from 10 to 90 wt%, more preferably from 30 to 80 wt% and yet more preferably from 40 to 70 wt%.

15        Characteristics of the Solid Stick

20        The insecticidal sticks of the present invention should not bend, crumble, crack or break during application. The physical properties and quality of the stick during manufacture, storage and use are determined for the most part by the composition of the fatty base composition. These properties and qualities are largely related to the rheology of the mixture at various temperatures. For example, during manufacture (usually while warm), it is preferably possible to mix or mill the formulation and to pour and mould it whilst holding any insoluble components evenly dispersed without settling. During shelf life and the life of usage, the stick should remain rigid and stable. In use, the stick must be capable of depositing composition onto hard surfaces on application of a downward force. The hard surfaces may, for example, be tiles, concrete, wood, stone, metal, glass or plastics such as melamine. It will be understood that hardness and deposition properties of the solid insecticidal sticks will vary somewhat depending on the composition, and in particularly the base



5       The solid sticks of the present invention suitably have the outward appearance of a cylinder, rod or crayon. The sticks may be any suitable shape in cross section including circular or a polygon of three or more sides. A preferred shape is circular. The sticks may be tapered  
10   at one or both ends, preferably one end.

      The sticks are typically of a size suitable for holding in the hand so as to allow the easy drawing of lines or spots on hard surfaces. Suitably, the sticks  
15   are from 10 to 300 mm in length, preferably from 30 to 200 mm, and more preferably from 50 to 120 mm. Suitably, the average cross-sectional area of the stick is from 20 to 2,000 mm<sup>2</sup>, preferably from 40 to 500 mm<sup>2</sup> and more preferably from 60 to 200 mm<sup>2</sup>.

20

      The hardness of the stick should be such that the crayon can be held near the surface to be treated and pressed onto and dragged across that surface with a moderate amount of force without breaking. At the same  
25   time it should be capable of depositing a sufficient quantity of material for cockroaches to ingest a lethal dose.

      The hardness and rigidity of the solid stick  
30   compositions may be determined by penetrometry. Suitable procedures are described in ASTM D1321; IP376; DIN 51579. For example, hardness may be measured using a lab plant PNT penetrometer equipped with a Seta wax needle (weight 2.5 grams) which has a cone angle at the point of the  
35   needle specified to be 9°10' +/- 15'. The barrel of the stick is cut to leave a flat uniform surface. The needle

5 is lowered onto the surface of the composition and then a penetration hardness measurement is conducted by allowing the needle with its holder to drop under a total weight, (ie. the combined weight of needle and holder) of 50 grams for a period of five seconds after which the depth  
10 of penetration is noted. Desirably the test is carried out at a number of points, e.g. six points, on each sample and the results are averaged.

Utilising a test of this nature, the solid  
15 insecticidal compositions of the present invention suitably have a penetration hardness of from 0.1 to 10 mm, preferably from 0.5 to 8 mm, more preferably from 1 to 5 mm and yet more preferably from 1 to 4.

20 The solid stick compositions may also be tested for their ability to deposit onto hard surfaces. For example, a suitable deposition test is to fit a sample of the composition with standardised shape and size to an apparatus which draws the sample across a test surface  
25 under standardised conditions. The amount transferred to the surface is then determined as an increase in the ~~weight of the substrate to which it is applied.~~ Suitable  
test substrates include ceramic tiles, concrete, wood, melamine (laminated), metal and glass.

30

The substrates are weighed before use. The sticks are previously unused. The apparatus comprises a flat base to which a flat substrate is attached by a clip at each end. A pillar having a mounting to receive a  
35 standard size stick is mounted on an arm that is moveable horizontally across the substrate by means of a pneumatic

5 piston. Each stick is kept at ambient laboratory temperature overnight before the measurement is made. The stick is placed in the apparatus and a spring positioned to bias the stick against the substrate with a standardised force. The apparatus is operated to pass  
10 the stick laterally across the substrate a set number of times. The substrate is carefully removed from the rig and reweighed.

Such a deposition test may also be used to help  
15 assess the quality and nature of the deposition, e.g. the adhesion properties, whether smearing is occurring and stability properties (e.g. drying-out properties).

Insecticidal compositions are often widely used in  
20 warm countries. For this reason, it is preferable that the stick compositions of the present invention have a reasonably high melting point. Suitably, the solid stick insecticidal compositions have a melting point of at least 20 °C, preferably at least 35 °C, more preferably  
25 at least 40 °C and even more preferably at least 45 °C.

The solid stick insecticidal compositions preferably have a setting point in the range from 20 to 200°C, more preferably from 30 to 70°C and yet more preferably from  
30 45-55 °C.

The stick may be used in an uncovered form. Alternatively, and preferably, the stick may be provided with a packaging. The packaging may cover the entire  
35 length of the stick or only part thereof. It may

5 comprise of a protective wrapping (paper, plastic,  
fabric, metal foil or other suitable material including  
laminated materials) axially orientated around the stick,  
which is suitably affixed, e.g. by gluing, along a line  
of overlap or as a self-adhesive sticker wrapping. The  
10 wrapping may be removed entirely before use of the stick.  
However, a preferred embodiment of this invention employs  
wrappings which can be readily torn to reveal "fresh"  
stick. Preferably such wrappings are designed to allow  
progressive tearing at predetermined points. This may be  
15 achieved, for example, by using an excess of wrapping  
material to generate a flap of wrapping material beyond  
the line of overlap and fixing. Tear lines or points of  
weakness are then generated at regular intervals along  
the flap as starting points for tearing off strips of  
20 wrapping. For example, serrations can provide points of  
weakness, especially in plastic wrappings. Other  
suitable tear starting points include short cuts and  
perforated lines in the flap of wrapping material.

Alternatively, the packaging may comprise an  
25 applicator made from, for example, plastic or metal. A  
simple applicator construct may comprise a bottom, in  
~~which is held one end of the stick, and a tubular lid,~~  
which may partially or fully enclose the insecticidal  
stick. In order to apply the insecticidal composition,  
30 the lid is removed and then replaced after use. More  
complex applicators enable the insecticidal stick to be  
extended from a casing. This may be achieved by having  
the insecticidal stick on a threaded screw and rotating  
the screw by turning the bottom of the applicator.  
35 Alternatively, the stick may be extended from and  
retracted into a casing by sliding it within the casing.

5 Typically this may be achieved by actuating an arm within  
a slot in and extending from the casing, the arm being  
connected to a housing holding the stick within the  
casing. The art is replete with examples of suitable  
applicators which may be employed with the insecticidal  
10 stick of the present invention. For example, applicators  
used in personal care for delivery of lipsticks,  
lipsalves and deodorants, are particularly useful.

The packaging itself can comprise a label or  
15 alternatively a label can be applied to the packaging.  
Suitably, the label includes information on the product,  
such as the brand name etc., and instructions for use. A  
major advantage of using a packaging is that it reduces  
the level of direct human contact with the insecticidal  
20 composition. In addition, wrappings tend to increase the  
strength of the sticks. Packagings in which the sticks  
are enclosed within rigid casings allow for stick  
compositions to be used that may not be entirely suitably  
for use as "crayon-like" products because, for example,  
25 they are softer in nature. Preferably, the packaging  
material is such that it does not allow the insecticidal  
composition, or components thereof, to leach into or out  
through it. Suitable wrapping materials in this respect  
include paper, plastic films (e.g. polypropylene),  
30 fabric, metal foil and laminates of these. When using  
paper or fabric as wrapping materials, it is desirable to  
coat the inside of the wrapping material coming into  
contact with the insecticidal composition with a suitable  
protective layer, such as an oil resistant layer.  
35 Examples of suitable paper wrappings include wax-coated  
paper, polymer film coated paper (e.g. milk carton

5 achieved through circulating water, which itself may have  
been chilled. The moulds are suitably made from metal,  
for example brass, and are commonly referred to as pipe  
moulds. The molten composition is poured onto a flatbed  
moulding table containing multiple holes (often  
10 thousands), each hole being suitably shaped to form, for  
example, a stick with a circular cross section and having  
a tapered end. As the molten compositions settles into  
the moulds, it is optionally cooled by circulating water.  
Once the insecticidal sticks have cooled and solidified,  
15 any excess material is scraped away and the sticks are  
removed from the moulds. Removal may be achieved by  
pushing rods, which sit at the base of the moulds during  
the casting process, into the moulds. The sticks may be  
further shaped once released. For example, they may be  
20 shaved or cut into appropriate lengths. The sticks may  
then go on to be packaged as it appropriate.

It is also possible to produce the insecticidal  
compositions of the present invention by extrusion  
25 techniques.

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#### Target Insects

The insecticidal sticks of the present invention may  
30 be used to control any insects which tend to crawl over  
hard surfaces such as ants, cockroaches, silverfish,  
terrestrial crustaceans such as woodlice (slaters),  
stored product pests, plus some flying insect pests such  
as flies which alight on various surfaces to feed. The  
35 compositions have been found to be particularly effective

- 5 at controlling the *Blattella germanica* (German cockroach) and *Periplaneta americana* (American cockroach).

The invention will now be further illustrated with reference to the following non-limiting examples:

5 EXAMPLESExample 1Solid stick insecticidal formulation

10

	<u>Component</u>	<u>Wt%</u>	<u>Function</u>
	Palm Stearine Hydrogenated	32.865	Base
	component/food material		
15	Soya bean Oil	7.455	Food
	material/attractant		
	Soya Lecithin	4.970	Base component/food
	Distilled Monoglyceride	1.491	Base component/food
	material		
20	Malt Liquid Extract Ltnd	12.921	Food
	material/attractant		
	Honey Manufacturing Grade	24.849	Food
	material/attractant		
	Soya Flour Full Fat	13.945	Base component/food
25	material		
	Chlorpyrifos 99%	0.353	Insecticide
	<del>Chlorpyrifos (MC) (H)</del>	<del>0.753</del>	<del>Insecticide</del>
	Denatonium Benzoate	2.5 % 0.040	Human taste
	deterrent		
30	Maple Lactone	0.010	Food
	material/attractant		
	Potassium Sorbate	0.298	Preservative
	TBHQ	0.050	Anti-oxidant



- 5   #   Chlorpyrifos   (MC)   is   a   microencapsulated  
chlorpyrifos, chlorpyrifos being present at 20 wt%  
of the capsule weight.

Method of preparation

10

The formulation given above was prepared as follows:

- i) With the temperature set to 70 °C the soy bean oil and palm stearine were added to a mixer and stirred.
- ii) Stirring was continued for 20 minutes, the  
15 temperature adjusted to 60°C and the potassium sorbate added.
- iii) Stirring was continued until the materials were well blended and temperature was stable at 60 °C.
- iv) The soy lecithin was preheated to 30 °C and added to  
20 the mixture.
- v) Stirring was continued until the mixture was well blended and then the distilled monoglyceride was slowly added.
- vi) The malt and honey were preheated 30 °C and then  
25 slowly added, with the stirrer speed reduced, along with the benatonium benzoate.
- vii) The mixture was stirred until well blended
- viii) The Tenox TBHQ was added to the mixture and stirring continued until well blended - some needles  
30 may still be visible at this stage
- ix) The soy flour was slowly added through a sieve and  
the mixture stirred until no lumps were visible and  
the mixture was golden yellow and smooth.
- x) Both the 99% chlorpyrifos and MC chlorpyrifos and  
35 maple lactone were added to the mixture and the mixture mixed until it was uniform.

- 5 xi) Mixing was continued at temperature of 57 to 60 °C  
for 15 minutes
- xii) A sample was taken for testing
- 10 xiii) The tested mix was then poured into brass  
crayon moulds and cooled (in this case refrigerated  
below 0 °C.)
- xiv) Once hardened (after about 15 minutes) they were  
pushed out of the brass moulds using a plastic  
plunger.
- 15 xv) The crayons were wrapped in self-adhesive plastic  
wrappers with one end of wrapper flush with end of  
the stick, exposing approximately 10 mm of crayon at  
the other end.

The temperature of the mixture was never allowed to rise  
20 above 65 °C during either the mixing or filling stages.

### Assay

The efficacy of the crayon composition was compared with  
25 that of a gel-type cockroach bait composition containing  
the same active ingredient in the same concentration.

~~-----The gel-type bait was applied as "blobs" onto the plastic-----~~  
test arenas. The crayon composition was drawn as smears  
onto the plastic test arenas.

30

- i) 8 mixed age and sex American cockroaches were placed  
in each of 6 plastic arenas (base area 1,785 cm<sup>2</sup> and  
height 19 cm); 100 mixed age and sex German  
cockroaches were placed in each of 6 plastic arenas  
35 (base area 988 cm<sup>2</sup> and height 11cm). The arenas  
were covered with ventilated plastic lids to prevent

- 5        escape. There were three replicates (arenas) for each of the bait treatments.
- ii) The cockroaches were provided with a harbourage in the form of half an up-turned egg carton, a water source and a dog food pellet. The positioning of the harbourage, food and water was the same for each arena.
- 10        iii) The cockroaches were allowed to acclimatise overnight and any dead were replaced the next morning.
- 15        iv) The compositions to be tested were applied as smears (crayon composition) or blobs (gel-type composition) of approximately 0.5 g to the surface of small plastic trays and the plastic trays placed in the same position in each of the treatment arenas.
- 20        There were six arenas for each of the two treatments (3 American cockroaches, 3 German cockroaches). The compositions were left in each arena for a further three days.
- 25        v) Cockroach mortality was assessed at the end of this period and the mean percentage mortality calculated.

### Results

Species	% mortality after 3 days	
	Crayon	Gel comparison
American cockroaches	89	51
German cockroaches	67	62

30        It is evident from these results that the composition of the present invention demonstrated a

5 superior efficacy against both species of cockroaches  
when compared to a conventional gel-type bait  
composition.

It will be appreciated by persons skilled in the art  
10 that numerous variations and/or modifications may be made  
to the invention as shown in the specific embodiments  
without departing from the spirit or scope of the  
invention as broadly described. The present embodiments  
are, therefore, to be considered in all respects as  
15 illustrative and not restrictive.

---

5 Example 2

Another suitable formulation of the present invention is:

	<u>Component</u>	<u>Wt%</u>	<u>Function</u>
10	Palm Stearine Hydrogenated component/food material	32.965	Base
	Soya bean Oil material/attractant	7.455	Food
15	Soya Lecithin	4.970	Base component/food
	Distilled Monoglyceride material	1.491	Base component/food
	Malt Liquid Extract Ltnd material/attractant	12.921	Food
20	Honey Manufacturing Grade material/attractant	24.849	Food
	Soya Flour Full Fat material	13.945	Base component/Food
	Chlorpyrifos 99%	0.506	Insecticide
25	Denatonium Benzoate 2.5 % deterrent	0.040	Human taste
	Maple Lactone material/attractant	0.010	Food
	Potassium Sorbate	0.298	Preservative
30	TBHQ	0.050	Anti-oxidant
	Carmoisine (*)	0.500	Colorant

\* 1.5 % (w/w) solution

5    CLAIMS

1.    A solid stick insecticidal composition comprising a  
base having dispersed therein an insecticide and an  
attractant or a food material, whereby when the  
10    stick is applied to a hard surface it leaves a  
deposit of the composition on the surface.
2.    An insecticidal composition according to claim 1  
comprising an insecticide selected from pyrethroids,  
15    neonicotinoids,            avermectins,            spinosyns,  
hydramethylnon,            fluorinated            sulfluoramides,  
organophosphates,            pyrazoles,            chlorfenapyr,  
indoxacarb, borates, benzoylphenyl ureas, carbamates  
and hydrazones.
- 20    3.    An insecticidal composition according to claim 2  
comprising chlorpyrifos as an organophosphate  
insecticide.
- 25    4.    An insecticidal composition according to any  
preceding claim comprising a microencapsulated  
insecticide.
5.    An insecticidal composition according to any  
30    preceding claim comprising insecticide in an amount  
of from 0.01 to 40 wt%, preferably from 0.01 to 20  
wt% and more preferably from 0.01 to 10 wt%.
6.    An insecticidal composition according to any  
35    preceding claim comprising a food material selected  
from

5 (i) carbohydrates selected from honey, sugars including monosaccharides and disaccharides, polysaccharides and complex carbohydrates including cellulosic materials, pectin and starches;

10 (ii) protein/carbohydrate containing materials selected from cereal products, soya flour, spices, vegetable products, dehydrated vegetables, dried yeast, egg powder and insect derived materials including silkworm pupa, eggs and body parts;

(iii) fatty or oily materials including lipids, essential oils, fully hydrogenated fatty acids, vegetable oils, esters, waxes, soaps, phospholipids, glycolipids, terpenes and steroids.  
20 and mixtures thereof.

7. An insecticidal composition according to any preceding claim comprising a food material which also functions as an attractant.  
25

8. An insecticidal composition according to any preceding claim comprising a component which acts as an attractant and not a food material.  
30

9. An insecticidal composition according to any preceding claim comprising soya bean oil as a food material and/or attractant.  
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- 5 10. An insecticidal composition according to any preceding claim comprising honey as a food material and/or attractant.
- 10 11. An insecticidal composition according to any preceding claim comprising maple lactone as a food material and/or attractant.
- 15 12. An insecticidal composition according to claim 11 comprising maple lactone in an amount of from 0.001 to 1 wt%, preferably from 0.005 to 0.5 wt %.
- 20 13. An insecticidal composition according to any preceding claim in which the total amount of food material and attractant is from 1 to 99.99 wt%, preferably from 5 to 99.99 wt% and more preferably from 10 to 99.99 wt%.
- 25 14. An insecticidal composition according to any preceding claim in which the base comprises from 1.0 to 99.9 wt%, preferably from 10 to 90 wt% and more preferably from 30 to 80 wt%.
- 
- 30 15. An insecticidal composition according to any preceding claim comprising base ingredients selected from fatty alcohols, fatty acids, various esters including lower alkyl esters of fatty acids, castor oil, mineral oils, petroleum jellies, polyethylene glycols, monoalkanolamides, carnauba wax, candelilla wax, amorphous hydrocarbon waxes, petroleum-based waxes including microcrystalline waxes, beeswax, 35 paraffin waxes, cocoa butter, hydrogenated vegetable



- 5 22. An insecticidal composition according to any one of claims 19 to 21 comprising from 0.0001 to 10 wt% of an anti-oxidant.
- 10 23. An insecticidal composition according to claim 22 comprising an anti-oxidant selected from TBHQ, butylated hydroxytoluene and butylated hydroxyanisole.
- 15 24. An insecticidal composition according to any one of claims 19 to 23 comprising from 1 to 200 ppm of a human taste deterrent.
- 20 25. An insecticidal composition according to claim 24, in which the denatonium benzoate is the human taste deterrent.
26. An insecticide composition according to any one of claims 19 to 25 comprising a colorant.
- 25 27. An insecticidal composition according to any preceding claim having a penetration hardness of from 0.1 to 10 mm.
- 30 28. An insecticidal composition according to any preceding claim having a melting point of at least 20 °C, preferably at least 35 °C, more preferably at least 40 °C and most preferably at least 45 °C.
- 35 29. An insecticidal composition according to any preceding claim having a setting point in the range

5 from 20 to 200°C, preferably from 30 to 70°C and more preferably from 45-55 °C.

30. A method for controlling insects in which a solid stick insecticidal composition according to any one of claims 1 to 29 is applied and deposited on to a hard surface to be treated.

31. A method for controlling insects according to claim 30, in which the insecticidal composition is applied as a line of material by drawing the stick along the surface.

32. A method for controlling insects according to claim 30, in which the insecticidal composition is applied as a series of spots on the surface.

33. A method for controlling insects according to claim 30, in which the insecticidal composition is applied as a smear on the surface.

34. A method for controlling insects according to any one of claims 30 to 33, in which the insects are crawling insects.

35. A method for controlling insects according to claim 34, in which the insects are cockroaches.

36. An insect control product comprising a solid stick insecticidal composition according to any one of claims 1 to 29 and a package.

- 5 37. An insect control product according to claim 36 in which the package comprises a protective wrapping.
38. An insect control product according to claim 37 in which the protective wrapping comprises paper,  
10 plastic, fabric, metal foil or laminates.
39. An insect control product according to claim 37 or claim 38, in which the wrapping includes tear lines or points of weakness at intervals along the length  
15 of the wrapping thus allowing for progressive removal of circumferential strips of wrapping from the stick.
40. An insect control product according to claim 36 in which the package comprises an applicator including  
20 a bottom, in which is held one end of the stick, and a tubular lid, which partially or fully encloses the insecticidal stick.
- 25 41. An insect control product according to claim 36 in which the package comprises an applicator in which the insecticidal stick is extendable from a casing.
42. An insect control product according to any one of  
30 claims 36 to 41 in which the package comprises a label or a label is applied to the package.
43. Use of an insecticide and an attractant or a food material in the manufacture a solid stick  
35 insecticidal composition according to any one of

5        claims 1 to 29 for application to a hard surface to  
be treated.

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**ABSTRACT**  
**INSECTICIDE COMPOSITION**

A solid stick insecticidal composition comprising a base  
having dispersed therein an insecticide and an attractant  
10 or a food material, whereby when the stick is applied to  
a hard surface it leaves a deposit of the composition on  
the surface.

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